We Claim:

1. A coating for a rolling element bearing, the coating comprising:

an adhesion layer which is applied to a surface of the bearing; said adhesion layer comprising an elemental metal which bonds to the bearing surface;

a primary coating layer comprised of a material that serves as a barrier to adhesive and abrasive wear; and

a solid lubricant layer.

2. The coating of claim 1 wherein said adhesion layer is chosen from the group consisting of Cr, Ti, and Si.

3. The coating of claim 1 wherein the adhesion layer has a thickness of less than about 1 micrometer thick.

4. The coating of claim 1 including a gradient layer which transitions between the adhesion layer and the primary coating layer.

5. The coating of claim 4 wherein the gradient layer is less than about 1 micrometer thick.

6. The coating of claim 1 wherein the primary coating layer is less than about 5 microns thick.

7. The coating of claim 1 wherein the material of the primary coating layer is chosen from the group consisting of amorphous hydrocarbons, nanocomposites, boron carbide, and tetrahedrally-bonded amorphous carbon.

8. The coating of claim 7 wherein the amorphous hydrocarbons contains ternary elements.

9. The coating of claim 8 wherein the ternary elements are chosen from the group consisting of Si, B, and N.

10. The coating of claim 7 wherein the nanocomposites comprise nanometer sized metal carbides embedded in amorphous hydrocarbon matrices.

11. The coating of claim 7 wherein the boron carbide includes nitrogen.

12. The coating of claim 1 wherein the solid lubricant layer is chosen from the group consisting of MoS_2, WS_2, boron nitride, graphite, PTFE, and metallic solid lubricants.

13. The coating of claim 12 wherein the material of the solid lubricant layer is combined with property imparting materials chosen from the group consisting of Ti, Au, Ag, Cu, TiC, TiB_2, Ni, and combinations thereof.

14. The coating of claim 12 wherein the metallic solid lubricant are chosen from the group consisting of silver, gold, lead, indium, nickel, chromium, copper, and cadmium.

15. The coating of claim 12 wherein, if the solid lubricant layer is a metallic lubricant, the solid lubricant layer has a thickness of less than about 5 microns thick.

16. A roller element bearing comprising an outer ring and an inner ring , each of which are provided with a respective raceway; a plurality of rolling elements positioned between the raceways; a cage which maintains the rolling elements in a spaced-apart relationship; the improvement comprising a coating which is applied to the bearing cage; the coating comprising:

an adhesion layer which is applied to a surface of the bearing; said adhesion layer comprising an elemental metal chosen from the group consisting of Cr, Ti, and Si;

a primary coating layer comprised of a material that serves as a barrier to adhesive and abrasive wear; the primary coating layer being chosen from the group consisting of amorphous hydrocarbons, nanocomposites, boron carbide, and tetrahedrally-bonded amorphous carbon; and

a solid lubricant layer; the solid lubricant layer being chosen from the group consisting of MoS_2, WS_2, boron nitride, graphite, PTFE, and metallic solid lubricants.

17. The roller element bearing of claim 16 wherein the coating is applied over the full surface of the cage.

18. The rolling element bearing of claim 16 wherein adhesion layer has a thickness of less than about 1 micrometer thick; and the primary coating layer has a thickness of less than about 5 microns thick.

19. The rolling element bearing of claim 16 wherein the coating further comprises a gradient layer which transitions between the adhesion layer and the primary coating layer.

20. The rolling element bearing of claim 19 wherein the gradient layer is less than about 1 micrometer thick.